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### REMARKS

With this amendment, Claims 1-3 and 5-15 remain pending in the present application. By this paper, Claim 1 has been amended; Claims 4 and 16 have been canceled. The Applicants respectfully request reconsideration and allowance of the above-referenced application in view of the foregoing amendments and the following remarks.

As conveyed to the Examiner during the interview, the Applicants' invention, in one aspect, is directed to a building material incorporating certain novel, engineered synthetic microspheres configured to improve the mechanical and physical properties of the building material. In particular, the microspheres of the preferred embodiments are engineered to retain a number of the beneficial properties associated with cenospheres derived from coal combustion and also to obtain additional advantageous properties not present in the cenospheres. The composition of the synthetic microspheres of the preferred embodiments is formulated in a manner such that the combined synergistic effect of certain key components in their respective proportions results in a product with advantageous attributes not present in cenospheres derived from coal combustion or conventional glass microspheres.

#### Obviousness Type Double Patenting

Claims 1-16 remain rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-45 of US Patent No. 6,572,697 to Gleeson et al., U.S. Publication Nos. 2004/0081827 and 2004/0080063 both to Datta et al. The Applicants respectfully request the Examiner to hold the double patenting rejection in abeyance until allowable claims are identified in the above-referenced application.

#### Rejections – 35 U.S.C. §§102/103

Claims 1-16 are also rejected under 35 U.S.C. §§102 (a and b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Pat. No. 6,626,991 to Drochon et al.; U.S. Pat. Nos. 4,370,166, 4,252,193, or 4,305,758 to Powers et al.; U.S. Pat. No. 4,661,137 to Garnier et al., U.S. Pat. Nos. 5,384,345 and 5,407,983 to Naton, U.S. Pat. No. 5,534,348 to Miller et al., U.S. Pat. No. 6,531,222 to Tanaka et al., U.S. Publication No. 20020004111 to Matsubara et al., U.S. Pat. No. 5,591,684 to Kawachi et al., U.S. Publication No. 20010043996 to Yamada et al., U.S. Pat. No. 6,444,162 to Anshits et al., U.S. Pat. Nos. 3,904,377 or 3,752,685 to Honda et al., U.S. Pat. No. 3,838,998 to Matthews et al., U.S. Pat. No. 3,256,105 to Alford,

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abstract of Pawlowski et al., U.S. Publication Nos. 20050011412, 20030177955 and U.S. Pat. No. 6,814,798 to Vijn et al., or U.S. Pat. Nos. 6,811,603 or 6,648,961 to Brothers et al.

After carefully reviewing each of the above references, the Applicants note that none of these references, either individually or in combination, teach or suggest a building material incorporating a plurality of synthetic microspheres having *an average particle diameter of between 30 to 1,000 microns* and comprising about *6 to 40 wt.% aluminum oxide*, about *5.2 to 30 wt.% calcium oxide*, about *4 to 10 wt.% sodium oxide*, wherein the microspheres have an *alkali metal oxide content of less than about 10 wt.%* based on the weight of the microspheres. (See, e.g., Claim 1 as amended)

*Drochon* discloses adding lightweight particles to a cement slurry which is used for cementing oil wells. The Applicants respectfully submit that the composition of the Applicants' synthetic microspheres is distinguishable from that of the lightweight particles disclosed in *Drochon*. The *Drochon* lightweight particles are cenospheres derived from coal burning (See, Col. 3, Lines 57-59) and/or Scotchlite™ microspheres manufactured by 3M Company (See, Col. 4, Lines 48-49). Cenospheres which are derived from coal burning, as is the case in *Drochon*, typically have a lower calcium oxide content than the Applicants' microspheres. Unlike *Drochon*, the Applicants' microspheres having a higher calcium oxide content in combination with the lower alkali metal oxide content advantageously improves the chemical durability of the Applicants' microspheres, particularly in an alkaline environment. With respect to the Scotchlite™ microspheres, they are composed of soda-lime-borosilicate glass which, to the best of the Applicants' knowledge, contains only minimal amounts, if any, of aluminum oxide. In contrast, the Applicants' microsphere composition preferably contains between about 6-40 wt.% aluminum oxide, which imparts certain favorable characteristics to the product not present in the Scotchlite™ microspheres.

The *Powers* references disclose adding hollow borosilicate glass microsphere to a cement slurry for the purposes of cementing oil wells. (See, e.g., Col. 7, Lines 1-2 and Col. 10, Lines 52-55) *Powers* further describes the glass microspheres as either sodium silicate glass spheres manufactured by Emerson & Cummings, Inc. or soda lime borosilicate glass spheres manufactured by 3M Company. The Applicants respectfully submit that, to the best of the Applicants' knowledge, the 3M glass microspheres do not contain the amount of aluminum

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oxide as recited in Claim 1 as they are made with conventional glass raw materials which are primarily based on borosilicate.

*Garnier* discloses a method of producing microspheres based on soda-lime-silica glass with low sulfur content. *Garnier* does not disclose a microsphere having an aluminum oxide content in the range claimed by the Applicants. (See, e.g., Col. 10, Lines 25-35) Unlike the Applicants' microspheres, the *Garnier* glass spheres do not utilize aluminosilicate as a raw material. Thus, it is unlikely that the *Garnier* glass microspheres would inherently have an aluminum oxide content as high as the Applicants' spheres.

The *Naton* patents disclose incorporating Scotchlite™ Glass Bubbles into an adhesive composition. As indicate above, to the best of the Applicants' knowledge, the Scotchlite™ glass bubble composition is based on borosilicate glass and does not contain an appreciable amount of aluminum oxide, at least not in the range recited in Claim 1 of the present application.

*Miller* is directed to a method of making a hollow borosilicate microsphere. The microspheres are made from spray drying a solution of sodium silicate and sodium borate. No where in *Miller* does it teach or suggest the microspheres as containing aluminum oxide in the range claimed by the Applicants. Furthermore, according to *Miller*, the starting material of microspheres preferably has a weight ratio of  $\text{Na}_2\text{O}:\text{SiO}_2:\text{B}_2\text{O}_3$  to be between 1.0:2.5:0.2 and 1.0:3.22:0.5 (See, Col. 3, Lines 60-64). Based on this weight ratio, the alkali metal oxide content is about 21.18 to 27.03 wt.%, which far exceeds the alkali metal oxide range of the Applicants' microspheres.

*Tanaka* is also directed to formation of hollow  $\text{B}_2\text{O}_3$ -containing glass microspheres. (See, Col. 4, Line 22). Similar to conventional glass microspheres, *Tanaka* also teaches using boron and silicon-containing compounds as the primary ingredients of the microsphere. (See, Examples 1-9) Furthermore, the examples in *Tanaka* show that only a very small amount of, if any, aluminum oxide, is used as a raw material ingredient. As such, it is unlikely that the *Tanaka* microspheres have an aluminum oxide content in the range as claimed by the Applicants.

While *Matsubara* discloses an aluminosilicate-based hollow microsphere, *Matsubara* teaches away from forming the microspheres with a sodium oxide content of between 4-10 wt.% as claimed by the Applicants. *Matsubara* emphasizes that it is necessary to restrict the total

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amount of  $\text{Na}_2\text{O} + \text{K}_2\text{O} + \text{Li}_2\text{O}$  to at most 1.0%, which would inherently limit the sodium oxide content to be less than 1.0 wt.% . (See, e.g., Page 2, Para 25)

The same argument applies to *Kawachi*, which discloses a glass bubble with a combined amount of  $\text{Na}_2\text{O} + \text{K}_2\text{O} + \text{Li}_2$  to be between 0-1.9%. (See, Col. 2, Lines 44-51) This restriction would inherently limit the sodium content of the Kawachi microspheres to be less than 1.9%.

*Yamada* discloses a process for forming aluminosilicate glass microspheres. However, the Yamada microspheres are smaller in diameter, below 20 microns, and thus cannot anticipate Claim 1. (See, paragraph 24) In fact, it is the Applicants' position that it would be very difficult to form microspheres with particle diameters that fall under the Applicants' claimed range using the process described in Yamada.

*Anshits* is directed to forming an open-cell glass crystalline porous material by sintering cenospheres derived from coal combustion. As mentioned above, one primary distinction in the composition between the Applicants' synthetic microspheres and the cenospheres is the calcium oxide content level. As expected from cenospheres derived from coal combustion, Anshits' porous material has a much lower calcium oxide and sodium level than the range claimed by the Applicants. (See, Col. 5, Lines 22-28)

The *Honda* references are directed to hollow glass microspheres produced from Shirasu particles, a naturally occurring volcanic pumice. To the best of the Applicants' knowledge, Shirasu spheres typically have a calcium oxide content of less than about 2 wt.%, which is less than the Applicants' claimed range. As such, the calcium oxide content of the Honda microspheres is inherently limited by the material source and the Honda references do not provide the motivation to change the formulation to increase the calcium oxide content of the spheres.

*Matthews* discloses a process for forming hollow glass microspheres. Matthews indicated that the composition of the microspheres is maintained in the approximate proportion by weight of 60:20:20, the numbers representing respectively silica, alumina, and soda oxides. (See, e.g., Col. 6, Lines 54-55) Calculations based on this ratio show that the microspheres have an alkali metal oxide content of 20 wt.%, which is outside of the Applicants' claimed range. As indicated previously, the Applicants' microspheres are engineered with a lower alkali metal oxide content in order to increase the chemical durability of the microspheres.

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*Alford* is directed to a ceramic molding composition comprising hollow glass microspheres and a binder comprising sodium silicate, boric acid and clay which is mixed in with the microspheres to form the composite article. *Alford* does not provide much information regarding the composition of the hollow microspheres other than that they may be composed of silica or an alkali metal silicate-based glass. *Alford* certainly does not teach or suggest the composition of the glass microspheres as having content levels claimed by the Applicants.

The abstract of *Pawlowski* discloses hollow cenospheres derived from coal combustion which has a calcium oxide content of 0.2 – 4.5 wt.% and thus does not fall under the range claimed by the Applicants.

The *Vijn* and *Brothers* references all teach adding Scotchlite™ or Spherelite™ hollow glass microspheres to cement slurry for cementing oil wells. The Applicants' claimed microspheres are distinguishable from Scotchlite as set forth above. With respect to Spherelite, to the best of the Applicants' knowledge, it is a fly ash microsphere having a composition similar to cenospheres derived from coal combustion, which does not provide the composition content range as claimed by the Applicants.

In view of the foregoing, the Applicants respectfully submit that the claimed invention is patentable over all of the cited prior art references.

Rejection—35 U.S.C. §112

The Examiner also rejected Claims 1-16 under 35 U.S.C. §112, second paragraph, as failing to set forth the subject matter which the Applicants regard as their invention. To address the issues raised by the Examiner, the Applicants have amended Claim 1 to recite additional limitations on the composition of the claimed microspheres to further point out and distinctly claim the identity of the microspheres. The Examiner also noted that perhaps the blowing agent should be included in Claim 1 as it appears to be a critical component of the instant invention. However, the Applicants would like to point out that while the blowing agent is an important component in making the microspheres, it is an intermediary component that is used to form the spheres and no substantial amounts of the blowing agent is present in the final microspheres. With respect to the Examiner's comments over the binding agent not being clearly defined, the Applicants respectfully submit that this issue is moot in view of the amendments made to Claim 1. Accordingly, the Applicants respectfully request the Examiner to withdraw this rejection.

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Objections to Specification and Terminology Contrary to Accepted Meaning

The Examiner also requested that the Applicants change all terms in the specification that refer to *natural cenospheres* to *cenospheres derived from coal combustion*. By this paper, the Applicants have amended the specification in accordance with the Examiner's request.

New Matter


The Examiner rejected Claim 16 under the first paragraph of 35 U.S.C. §112 and 35 U.S.C. §132 as the Examiner believes that the specification as originally filed does not provide support for the invention as is now claimed. While this issue has become moot in view of cancellation of Claim 16 by this amendment, the Applicants respectfully disagree with the Examiner's determination. The Applicants further submit that a calcium oxide content of between 5.2 to 30 wt.% is supported by the specification. Referring to Table 13 on page 33 of the specification, the Applicants note that a calcium oxide content of 5.2 wt.% is provided as that of a synthetic microsphere of the instant invention. Further, referring to page 7 of the specification, it clearly stated that the microsphere could have up to about 30 wt.% divalent metal oxides such as CaO. Moreover, additional examples in the specification show calcium oxide content levels to range between 5.2 and 30 wt. %.

CONCLUSION

In view of the foregoing, the Applicants respectfully submit that the above-referenced application is in condition for allowance and respectfully request the same. Should there be any additional issues that can be resolved by an examiner's amendment, the Examiner is respectfully requested to call the undersigned at the number shown below. Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,  
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 10/27/05

By:   
Linda H. Liu  
Registration No. 51,240  
Attorney of Record  
Customer No. 20,995  
(951) 781-9231

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### **SUMMARY OF INTERVIEW**

As an initial matter, the Applicants would like to thank the Examiner for extending the courtesy of an interview to the Applicants' representatives, Linda H. Liu and Jeremy P. Sanders, on October 19, 2005.

During the interview, proposed claim amendments were discussed in light of the references cited by the Examiner in the office action mailed on April 27, 2005. The Examiner and the Applicants' representatives discussed amending the claims to further distinguish from the art of record. The Examiner also suggested that the Applicants point out the distinctions between the Applicants' claimed invention and each of the cited prior art reference. By this paper, the Applicants have amended Claim 1 to incorporate the amendments discussed with the Examiner and are now requesting reconsideration of the above-captioned application in light of the amended Claim 1 and the remarks contained herein.